




# Jeongbhin Seo, Ph.D.




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🌐 <https://jeongbhin.github.io/>





## Employment History

- 2024.10 - - - - -  **Chick Keller Fellow**, Los Alamos National Laboratory, Theoretical Division  
Advisor: Dr. Fan Guo, Dr. Hui Li
- 2023.12 - - 2024.9  **Postdoctoral Researcher**, Los Alamos National Laboratory, Theoretical Division  
Advisor: Dr. Fan Guo, Dr. Hui Li
- 2022.9 - - 2023.11  **Postdoctoral Researcher**, Department of Physics, Ulsan National Institute of Science & Technology.  
Advisor: Prof. Dongsu Ryu

## Education




- 2018.09 - - 2022.08  **Ph.D., Pusan National University** Earth Science.  
Advisor: Prof. Hyesung Kang  
Degree date: 08/26/2022  
Thesis title: *A Simulation Study of Ultra-relativistic Jets.*
- 2015.03 - - 2018.02  **M.Sc., Pusan National University** Earth Science.  
Advisor: Prof. Hyesung Kang  
Degree date: 02/23/2018  
Thesis title: *The Contribution of Stellar Winds to Cosmic Ray Production.*
- 2008.03 - - 2012.02  **B.Ed., Pusan National University** Earth Science Education.  
Degree date: 02/17/2012





## Awards and Fellowships

- 2024  **LANL SPOT Award**, Los Alamos National Laboratory
- 2024-2027  **Chick Keller Fellow**, Los Alamos National Laboratory
- 2021  **Busan Future Scientist Award**, Federation of Busan Science and Technology
- 2020-2022  **NRF Ph.D. Fellow**, The National Research Foundation of Korea

## Research Publications

### PEER REVIEWED PAPERS

- 1 **J. Seo**, F. Guo, X. Li, and H. Li, "Proton Acceleration in Low- $\beta$  Magnetic Reconnection with Energetic Particle Feedback," *Submitted to the Astrophysical Journal*, Apr. 2024.
- 2 **J. Seo**, H. Kang, and D. Ryu, "Model Spectrum of Ultrahigh-energy Cosmic Rays Accelerated in FR-I Radio Galaxy Jets," *The Astrophysical Journal*, vol. 962, no. 1, p. 46, Feb. 2024.  DOI: 10.3847/1538-4357/ad182c.
- 3 **J. Seo**, H. Kang, and D. Ryu, "A New Code for Relativistic Hydrodynamics and its Application to FR II Radio Jets," *IAU Symposium*, vol. 362, pp. 87-93, Jan. 2023.  DOI: 10.1017/S1743921322001314.
- 4 **J. Seo** and D. Ryu, "HOW-MHD: A High-order WENO-based Magnetohydrodynamic Code with a High-order Constrained Transport Algorithm for Astrophysical Applications," *Astrophysical Journal*, vol. 953, no. 1, p. 39, Aug. 2023.  DOI: 10.3847/1538-4357/acdf4b.



- 5 J. Seo, D. Ryu, and H. Kang, "A Simulation Study of Ultra-relativistic Jets. III. Particle Acceleration in FR-II Jets," *Astrophysical Journal*, vol. 944, no. 2, 199, p. 199, Feb. 2023.  DOI: 10.3847/1538-4357/acb3ba.
- 6 J. Seo, H. Kang, and D. Ryu, "A Simulation Study of Ultra-relativistic Jets. II. Structures and Dynamics of FR-II Jets," *Astrophysical Journal*, vol. 920, no. 2, 144, p. 144, Oct. 2021.  DOI: 10.3847/1538-4357/ac19b4.
- 7 J. Seo, H. Kang, D. Ryu, S. Ha, and I. Chattopadhyay, "A Simulation Study of Ultra-relativistic Jets-I. A New Code for Relativistic Hydrodynamics," *Astrophysical Journal*, vol. 920, no. 2, 143, p. 143, Oct. 2021.  DOI: 10.3847/1538-4357/ac19b3.
- 8 J. Seo, H. Kang, and D. Ryu, "The Contribution of Stellar Winds to Cosmic Ray Production," *Journal of Korean Astronomical Society*, vol. 51, no. 2, pp. 37–48, Apr. 2018.  DOI: 10.5303/JKAS.2018.51.2.37.

## Conferences






### Invited talks, Seminars, and Colloquia

- |         |  |
|---------|--|
| 2024.04 |  "Acceleration of Non-Thermal Electrons in Solar Flares".<br><b>CfA Solar Science Meeting</b> . Cambridge, MA.                                    |
|         |  "Radio Galaxy Jets as an Origin of Ultra-High Energy Cosmic Rays".<br><b>CfA High Energy Seminar</b> . Cambridge, MA.                            |
|         |  "Radio Galaxy Jets as an Origin of Ultra-High Energy Cosmic Rays".<br><b>CfA Galaxy Cluster Group Meeting</b> . Cambridge, MA.                   |
| 2024.03 |  "Particle Acceleration in Astrophysical Phenomena".<br><b>LANL Plasma Group Seminar</b> . Los Alamos, NM.                                      |
| 2023.11 |  "Radio Galaxies as the Origin of Ultra-High-Energy Cosmic Rays".<br><b>71st GWN Workshop</b> . Daejeon, South Korea                            |
| 2023.03 |  "Acceleration of Ultra-High Energy Cosmic Rays at Radio Galaxy Jets".<br><b>Max-Planck institute: The VLBI Group Seminar</b> . Online, Germany |
| 2023.01 |  "A Simulation Study of Radio Galaxy Jets".<br><b>2023 SKA-Korea Workshop</b> . Cheonan, South Korea  |
| 2022.12 |  "Particle Acceleration in Radio Galaxy Jets".<br><b>6th CHEA Workshop</b> . Cheonan, South Korea   |
| 2022.09 |  "An introduction to relativistic hydrodynamics simulation and its application".<br><b>66th GWN Workshop</b> . Pohang, South Korea              |
| 2021.12 |  "FR-II radio jets and the acceleration of UHECRs".<br><b>Korea young Astronomers Meeting Colloquium</b> . Online, South Korea                  |
| 2021.11 |  "FR-II radio jets and the acceleration of UHECRs".<br><b>5th CHEA Workshop</b> . Busan, South Korea  |
| 2020.01 |  "A simulation study of ultra-relativistic jets".<br><b>4th CHEA Workshop</b> . Busan, South Korea  |
| 2019.01 |  "The contribution of Stellar Winds to Cosmic Ray Production".<br><b>3rd CHEA Workshop</b> . Gyeongju, South Korea                              |








### International Conferences

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|---------|---|
| 2024.08 |  "Efficient Electron Acceleration in the Solar Flare Region".<br><b>SHINE Workshop</b> , Juneau, AK, Poster                      |
| 2024.07 |  "Acceleration of Non-Thermal Electrons in Solar Flares".<br><b>HINODE-17/IRIS-15/SPHERE-3 Joint Meeting</b> , Bozeman, MT, Talk |



## Conferences (continued)

- 2023.07     “Generation of Ultra-High Energy Cosmic Rays at Radio Galaxy Jets”.  
ICGAC15, Gyeongju, South Korea, Talk
- 2023.06     “A New WENO Magnetohydrodynamic Code with a High-Order Constrained Transport Scheme”.  
2023 ASTRONUM. Pasadena, CA, Poster
- 2022.09     “Particle acceleration at relativistic jets of FR-II radio galaxies”.  
2022 IAUGA. Busan, South Korea, Poster
- 2022.06     “Relativistic Hydrodynamic Simulations of Ultra-relativistic Jets in the Intracluster Medium”.  
2022 EAS. Valencia, Spain, Poster
- 2021.11     “A New Code for Relativistic Hydrodynamics and its Application to FR II Radio Jets”.  
IAU Symposium 362: Computational astrophysics, Online, Talk




## Domestic Conferences

- 2023.10     “Radio Galaxies as the Origin of Ultra-High-Energy Cosmic Rays”.  
2023 108th KAS Fall Meeting. Jeju, South Korea, Talk
- 2023.04     “A New Magnetohydrodynamic Code with a High-Order Constrained Transport Scheme”.  
2023 107th KAS Spring Meeting. Jeonju, South Korea, Talk
- 2022.04     “Acceleration of Ultra-high Energy Cosmic Rays at Relativistic Jets”.  
2022 105th KAS Spring Meeting. Busan, South Korea, Talk
- 2021.10     “FR-II radio jets and the acceleration of UHECRs”.  
2021 104th KAS Fall Meeting. Jeju, South Korea, Talk
- 2021.04     “Structures and Energetics of Flows in Ultra-relativistic Jets”.  
2021 103th KAS Spring Meeting. Online, South Korea, Talk
- 2020.10     “A New Code for Relativistic Hydrodynamics”.  
2020 102th KAS Fall Meeting. Online, South Korea, Poster
-  “Morphology and Dynamical Properties of Ultra-Relativistic Jets”.  
2020 102th KAS Fall Meeting. Online, South Korea, Talk

## Collaboration

- 2019 - - - - -     **Center for High Energy Astrophysics (CHEA)**  
Ulsan National Institute of Science & Technology, South Korea
- 2022 - - - - -     **Wombat User Group**  
University of Minnesota, USA

## Skills

- Languages     English, Korean
- Coding         Fortran, Python, C++, IDL,  $\text{\LaTeX}$ , OpenMP, MPI
- Research      Particle acceleration, Relativistic Jets, Magnetic Reconnection, Collisionless Shock, Astrophysical Turbulence, Galaxy Cluster, Solar Flare, Heliosphere, Hydrodynamics (HD), Relativistic Hydrodynamics (RHD), Magneto-Hydrodynamics (MHD), Monte-Carlo simulation, Simulation code development

## High Performance Computing

0.1M CPU Times	LANL HPC, MHD, Particle acceleration Simulations
0.4M CPU Times	NERSC, MHD, Particle acceleration Simulations
4M CPU Times	CHEA Cluster, MHD, RHD, Monte-Carlo Simulations
2M CPU Times	UNIST Supercomputing Center, RHD Simulations
1M CPU Times	PNU Cluster, HD, RHD, Monte-Carlo Simulations

## Public Outreach

2023.08	“The Theory and Practice of Astronomical Observation”. <b>Physics Festival for High School students</b> , Ulsan, South Korea
2023.07	“Relativistic hydrodynamics and a simulation study of ultra-relativistic jets”. <b>Numerical relativity and gravitational wave summer school</b> , Daejeon, South Korea
2023.05	“Path to Becoming an Astrophysicist”. <b>Gaeun Middle School</b> , Yangsan, South Korea
	“Path to Becoming an Astrophysicist”. <b>Muryong High School</b> , Ulsan, South Korea
2023.01	“Solving partial differential equations using numerical methods”. <b>Numerical relativity and gravitational wave winter school</b> , Ulsan, South Korea
2022.11	“From a science teacher to an astrophysical researcher”. <b>PNU Future Education Center</b> , Busan, South Korea
2022.10	“What does an astrophysicist do?”. <b>Gaeun Middle School</b> , Yangsan, South Korea
2022.07	“Career Mentoring Program - Astrophysicist”. <b>PNU Future Education Center</b> , Busan, South Korea
2021.12	“The usage of coding in astrophysics”. <b>Mulgeum High School</b> , Yangsan, South Korea
2021.11	“What does an astrophysicist do?”. <b>Muryong High School</b> , Ulsan, South Korea

## Academic services

2024.02 - - - - -	<b>Workshop Organizer</b> LANL Plasma Group Meeting
2023.03 - - 2023.11	<b>Workshop Organizer</b> 68th-71st Workshop on Gravitational Waves and Numerical Relativity
2023.05 - - 2023.11	<b>Workshop Organizer</b> 2023 Korea Numerical Astrophysics Group Workshop

## Teaching Experience

2024.02 - - - - -	<b>Postbac Mentor</b> LANL, NM, United States
2020.03 - - 2022.08	<b>Teaching Assistant</b> Pusan National University, South Korea

## Teaching Experience (continued)

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2012.03 - - 2019.08



**High/Middle School Science Teacher**

Gyeongsangnam-do Office of Education, South Korea